TOPIC: 291007
KNOWLEDGE: K1.01 [2.6/2.7]
QID: B637 (P2135)

High differential pressure in a demineralizer could be caused by all of the following except...

A. resin exhaustion.

B. resin overheating.

C. crud buildup.

D. high flow rate.

ANSWER: A.

TOPIC: 291007
KNOWLEDGE: K1.01 [2.6/2.7]
QID: B737 (P935)

A demineralizer is being used in a water purification system. How will accumulation of suspended solids in the demineralizer affect performance of the demineralizer?

A. The rate of resin depletion will increase.

B. The flow rate of water through the demineralizer will increase.

C. The differential pressure across the demineralizer will decrease.

D. The rate of unwanted ion removal from the system will decrease.

ANSWER: D.

TOPIC: 291007
KNOWLEDGE: K1.02 [2.8/2.9]
QID: B152 (P1835)

The ion exchange efficiency of a condensate demineralizer can be determined by...

A. sampling the inlet and outlet of the demineralizer to determine the change in conductivity.

B. performing a calculation based on the ratio between the inlet pH divided by the outlet pH.

C. sampling the inlet and outlet of the demineralizer to determine the difference in activity.

D. performing a calculation based on the change in differential pressure across the demineralizer.

ANSWER: A.

TOPIC: 291007
KNOWLEDGE: K1.02 [2.5/2.6]
QID: B839 (P835)

The demineralization factor of a demineralizer can be expressed as...

A. (Inlet Conductivity) - (Outlet Conductivity).

B. (Outlet Conductivity) - (Inlet Conductivity).

C. (Inlet Conductivity) ÷ (Outlet Conductivity).

D. (Outlet Conductivity) ÷ (Inlet Conductivity).

ANSWER: C.

TOPIC: 291007
KNOWLEDGE: K1.02 [2.5/2.6]
QID: B1437 (P2236)

To determine the demineralization factor for a demineralizer, the two parameters that must be monitored are inlet and outlet...

A. pH.

B. conductivity.

C. suspended solids.

D. pressure.

ANSWER: B.

TOPIC: 291007
KNOWLEDGE: K1.02 [2.5/2.6]
QID: B2737 (P2735)

What percentage of impurities is being removed from the water passing through an ion exchanger if the ion exchanger has a decontamination factor of 25?

A. 99%

B. 96%

C. 88%

D. 75%

ANSWER: B.

TOPIC: 291007
KNOWLEDGE: K1.02 [2.5/2.6]
QID: B2837 (P936)

The ion exchange efficiency of a condensate demineralizer is determined by performing a calculation using the...

A. change in conductivity at the outlet of the demineralizer over a period of time.

B. change in pH at the outlet of the demineralizer over a period of time.

C. demineralizer inlet and outlet conductivity.

D. demineralizer inlet and outlet pH.

ANSWER: C.

TOPIC: 291007
KNOWLEDGE: K1.02 [2.5/2.6]
QID: B3238 (P3235)

What percentage of ionic impurities is being removed from the water passing through an ion exchanger if the ion exchanger has a decontamination factor of 50?

A. 98%

B. 96%

C. 75%

D. 50%

ANSWER: A.

TOPIC: 291007
KNOWLEDGE: K1.02 [2.5/2.6]
QID: B3437 (P3435)

The decontamination factor (also called the demineralization factor) of a condensate demineralizer has just been determined to be 50, based on conductivity measurements.

If condensate having a conductivity of 20 µmho/cm is flowing into this demineralizer, which one of the following is the conductivity of the condensate at the outlet of the demineralizer?

A. 0.4 µmho/cm

B. 1.0 µmho/cm

C. 4.0 µmho/cm

D. 10.0 µmho/cm

ANSWER: A.

TOPIC: 291007
KNOWLEDGE: K1.02 [2.5/2.6]
QID: B3637 (P3636)

The decontamination factor (or demineralization factor) of a condensate demineralizer has just been determined to be 10, based on conductivity measurements.

If condensate having a conductivity of 20 µmho/cm is flowing into this demineralizer, which one of the following is the conductivity of the condensate at the outlet of the demineralizer?

A. 0.5 µmho/cm

B. 2.0 µmho/cm

C. 5.0 µmho/cm

D. 10.0 µmho/cm

ANSWER: B.

TOPIC: 291007
KNOWLEDGE: K1.03 [2.8/2.9]
QID: B38

What adverse effect occurs due to channeling in a demineralizer?

A. Increased demineralizer outlet conductivity because much of the resin is essentially bypassed

B. Loss of resin due to agitation resulting from increased fluid velocity through the demineralizer

C. Resin dryout and cracking because much of the resin is essentially bypassed

D. Resin damage due to the increased velocity of fluid through the demineralizer

ANSWER: A.

TOPIC: 291007
KNOWLEDGE: K1.03 [2.5/2.6]
QID: B236

Channeling in a demineralizer is undesirable because the...

A. ability of the resin bed to remove undesirable ions will decrease and cause outlet conductivity to increase.

B. ability of the resin bed to remove suspended solids will decrease and cause outlet pH to increase.

C. resulting high velocity fluid flow will cause agitation of the resin beads and the release of unwanted ions.

D. resulting high velocity fluid flow can cause significant damage to resin retention elements.

ANSWER: A.

TOPIC: 291007
KNOWLEDGE: K1.03 [2.8/2.9]
QID: B838 (P1636)

Which one of the following, if processed through a demineralizer, will rapidly reduce the effectiveness of the demineralizer?

A. Oily water

B. Condensate

C. Makeup water

D. Radioactive water

ANSWER: A.

TOPIC: 291007
KNOWLEDGE: K1.03 [2.8/2.9]
QID: B1038.

Which one of the following refers to the condition in which large portions of a demineralizer resin bed are bypassed, thereby allowing waterborne impurities to reach the outlet?

A. Channeling

B. Leaching

C. Exhaustion

D. Mineralization

ANSWER: A.

TOPIC: 291007
KNOWLEDGE: K1.03 [2.8/2.9]
QID: B1237 (P2035)

Which one of the following conditions will lead to channeling in a demineralizer?

A. Suspended solids and insoluble particles forming a mat on the surface of the resin bed.

B. A sudden 10°F decrease in the temperature of the influent to the demineralizer.

C. Exhaustion of the resin bed due to high conductivity of the demineralizer influent.

D. Operation of the demineralizer with influent flow rate at 10% below design flow rate.

ANSWER: A.

TOPIC: 291007
KNOWLEDGE: K1.04 [2.8/2.9]
QID: B118

The purpose of a mixed-bed demineralizer is to...

A. raise the conductivity of water with little effect on pH.

B. reduce the conductivity of water with little effect on pH.

C. increase the pH of water by reducing the number of positively charged ions in it.

D. decrease the pH of water by increasing the number of negatively charged ions in it.

ANSWER: B.

TOPIC: 291007
KNOWLEDGE: K1.05 [2.4/2.5]
QID: B1138 (P1535)

A condensate demineralizer differential pressure (D/P) gauge indicates 4 psid at 50% flow. Over the next two days plant power changes have caused condensate flow to vary between 25% and 100%.

Which one of the following combinations of condensate flow and demineralizer D/P, observed during the power changes, indicates an increase in the accumulation of corrosion products in the demineralizer?

	CONDENSATE FLOW	DEMINERALIZER D/P (PSID)
A.	100%	15.0
B.	75%	9.0
C.	60%	5.0
D.	25%	2.0

ANSWER: D.

TOPIC: 291007
KNOWLEDGE: K1.05 [2.4/2.5]
QID: B1539 (P1537)

A higher than expected differential pressure across an operating demineralizer will be caused by...

A. depletion of the cation resin.

B. channeling through the resin bed.

C. insufficient resin backwash.

D. decreased demineralizer outlet conductivity.

ANSWER: C.

TOPIC: 291007
KNOWLEDGE: K1.05 [2.4/2.5]
QID: B1736 (P1736)

A condensate demineralizer differential pressure (D/P) gauge indicates 6 psid at 50% flow rate. Which one of the following combinations of condensate flow and demineralizer D/P observed later at various power levels indicates an increase in the accumulation of insoluble corrosion products in the demineralizer?

	CONDENSATE FLOW	DEMINERALIZER D/P (PSID)
A.	100%	23.5
B.	75%	16.5
C.	60%	8.5
D.	25%	1.5

ANSWER: B.

TOPIC: 291007
KNOWLEDGE: K1.05 [2.4/2.5]
QID: B2237 (P635)

How does demineralizer differential pressure indicate the condition of a demineralizer resin bed?

A. Low differential pressure indicates flow blockage in the demineralizer.

B. Low differential pressure indicates that the demineralizer resin bed is exhausted.

C. High differential pressure indicates flow blockage in the demineralizer.

D. High differential pressure indicates that the demineralizer resin bed is exhausted.

ANSWER: C.

TOPIC: 291007
KNOWLEDGE: K1.05 [2.4/2.5]
QID: B2338 (P2335)

A condensate demineralizer differential pressure (D/P) gauge indicates 4.0 psid at 50% flow. Over the next two days plant power changes have caused condensate flow to vary between 25% and 100%.

Which one of the following combinations of condensate flow and demineralizer D/P, observed during the power changes, indicates an increased accumulation of corrosion products in the demineralizer?

	CONDENSATE FLOW	DEMINERALIZER D/P (PSID)
A.	100%	15.0
B.	75%	9.0
C.	40%	3.0
D.	25%	1.0

ANSWER: C.

TOPIC: 291007
KNOWLEDGE: K1.05 [2.4/2.5]
QID: B2638 (P2235)

A condensate demineralizer differential pressure (D/P) gauge indicates 4 psid at 50% flow rate. Which one of the following combinations of condensate flow and demineralizer D/P observed at various power levels indicates an increase in the accumulation of insoluble corrosion products in the demineralizer?

	CONDENSATE FLOW	DEMINERALIZER D/P (PSID)
A.	25%	1.0
B.	60%	6.5
C.	75%	9.0
D.	100%	15.5

ANSWER: B.

TOPIC: 291007
KNOWLEDGE: K1.05 [2.4/2.5]
QID: B2938

A condensate demineralizer differential pressure (D/P) gauge indicates 9 psid at 50% flow. Over the next two days, plant power changes cause condensate flow to vary between 10% and 100%.

Which one of the following combinations of condensate flow and demineralizer D/P, if observed during the power changes, would indicate a detectable increase in the accumulation of corrosion products in the demineralizer?

	CONDENSATE FLOW	DEMINERALIZER D/P (PSID)
A.	10%	0.3
B.	25%	3.3
C.	75%	20.3
D.	100%	35.3

ANSWER: B.

TOPIC: 291007
KNOWLEDGE: K1.06 [2.7/2.7]
QID: B238

The temperature of the water passing through a demineralizer must be controlled because excessively hot water will...

A. increase the ion exchange rate for hydronium ions, thereby changing effluent pH.

B. degrade the corrosion inhibitor applied to the inner wall of the demineralizer.

C. result in excessive demineralizer retention element thermal expansion, thereby releasing resin.

D. reduce the affinity of the demineralizer resin for ion exchange.

ANSWER: D.

TOPIC: 291007
KNOWLEDGE: K1.06 [2.7/2.7]
QID: B438

There is a temperature limit on the water entering a demineralizer because excessively hot water...

A. will decompose the resin beads.

B increases the potential for channeling.

C. causes the filter element to swell and release the resin.

D. will dislodge and wash the resin fines off the filter element.

ANSWER: A.

TOPIC: 291007
KNOWLEDGE: K1.07 [2.3/2.5]
QID: B938

The cation resin in a mixed-bed demineralizer releases desirable _____ ions into solution while removing undesirable _____ ions from solution.

A. negative; negative

B. negative; positive

C. positive; negative

D. positive; positive

ANSWER: D.

TOPIC: 291007
KNOWLEDGE: K1.07 [2.3/2.5]
QID: B1039

The anion resin in a mixed-bed demineralizer releases desirable _____ ions into solution while removing undesirable _____ charged ions from solution.

A. hydroxide; negatively

B. hydroxide; positively

C. hydrogen; negatively

D. hydrogen; positively

ANSWER: A.

TOPIC: 291007
KNOWLEDGE: K1.07 [2.3/2.5]
QID: B1637

Which one of the following will decrease the time required for a demineralizer to reduce by one-half the ionic impurities in a closed process water system?

A. Divert 50% of the process water to bypass the demineralizer.

B. Reverse the flow of process water through the demineralizer.

C. Increase the temperature of the process water from 100°F to 110°F.

D. Decrease the flow rate of the process water from 105 gpm to 90 gpm.

ANSWER: C.

TOPIC: 291007
KNOWLEDGE: K1.07 [2.3/2.5]
QID: B1639

If a dilute sodium chloride water solution is passed through an ideal mixed-bed demineralizer, the effluent stream would consist of...

A. a sodium hydroxide solution.

B. a hydrogen chloride solution.

C. a sodium hypochlorite solution.

D. pure water.

ANSWER: D.

TOPIC: 291007
KNOWLEDGE: K1.07 [2.3/2.5]
QID: B1738

Which one of the following describes the process of backwashing a mixed-resin deep bed demineralizer?

A. Alternating the flow of dilute acidic and caustic solutions through the demineralizer to remove suspended solids and colloidal matter

B. Alternating the flow of dilute acidic and caustic solutions through the demineralizer to remove ionic impurities

C. Reversing flow of pure water through the demineralizer to remove suspended solids and colloidal matter

D. Reversing flow of pure water through the demineralizer to remove ionic impurities

ANSWER: C.

TOPIC: 291007
KNOWLEDGE: K1.07 [2.3/2.5]
QID: B1838

When a mixed-bed demineralizer resin is exhausted, the resin should be replaced or regenerated because...

A. ions previously removed by the resin will be released into solution.

B. the resin will fracture and possibly escape through the retention screens.

C. particles previously filtered out of solution will be released.

D. the resin will physically bond together, thereby causing a flow blockage.

ANSWER: A.

TOPIC: 291007
KNOWLEDGE: K1.07 [2.3/2.5]
QID: B2138 (P2836)

Refer to the drawing of a parallel demineralizer loop that is currently aligned for normal flow direction through the demineralizer (see figure below).

A minor seawater leak has occurred into the process water system, which is a closed system. Which one of the following will decrease the time required for the demineralizer loop to reduce the concentration of ionic impurities in the process water system?

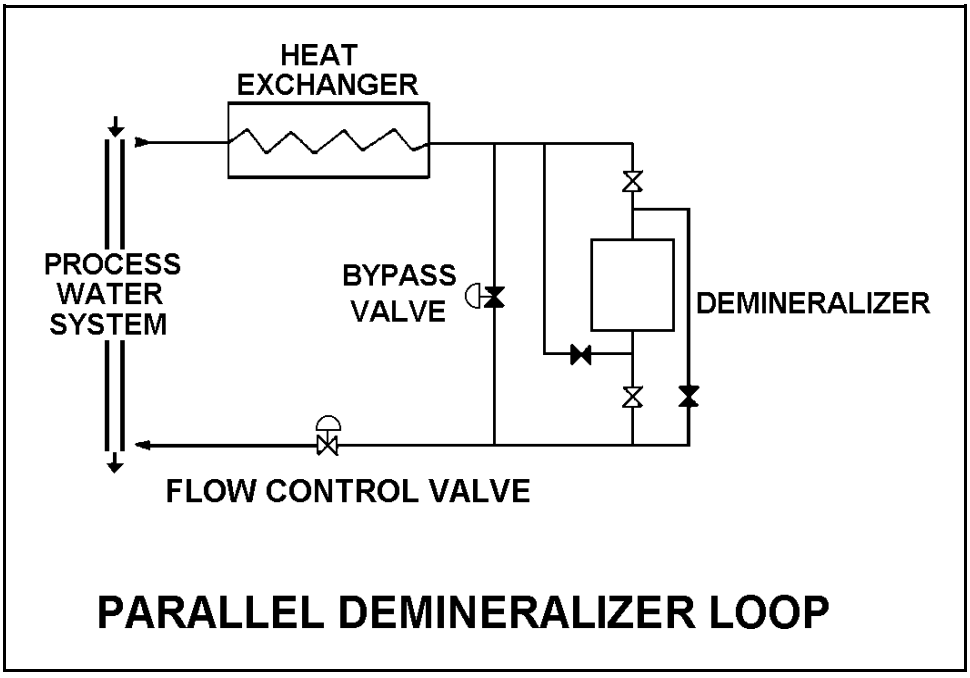
A. Reverse the flow direction through the demineralizer.

B. Divert 50% of the loop flow to bypass the demineralizer.

C. Increase the flow rate in the loop from 95 gpm to 105 gpm.

D. Decrease the temperature in the loop from 110°F to 100°F.

ANSWER: C.



TOPIC: 291007
KNOWLEDGE: K1.07 [2.3/2.5]
QID: B2438

Which one of the following describes the process of regenerating a mixed-resin deep bed demineralizer? (Assume the demineralizer has already been backwashed.)

A. Alternating the flow of acidic and caustic solutions through the demineralizer to remove suspended solids and colloidal matter.

B. Alternating the flow of acidic and caustic solutions through the demineralizer to remove ionic impurities.

C. Reversing flow of pure water through the demineralizer to remove suspended solids and colloidal matter.

D. Reversing flow of pure water through the demineralizer to remove ionic impurities.

ANSWER: B.

TOPIC: 291007
KNOWLEDGE: K1.07 [2.3/2.5]
QID: B3739 (P3736)

Refer to the drawing of a parallel demineralizer loop that is currently aligned for normal flow direction through the demineralizer (see figure below).

Which one of the following is most likely to cause a decrease in the demineralizer decontamination factor for ionic impurities?

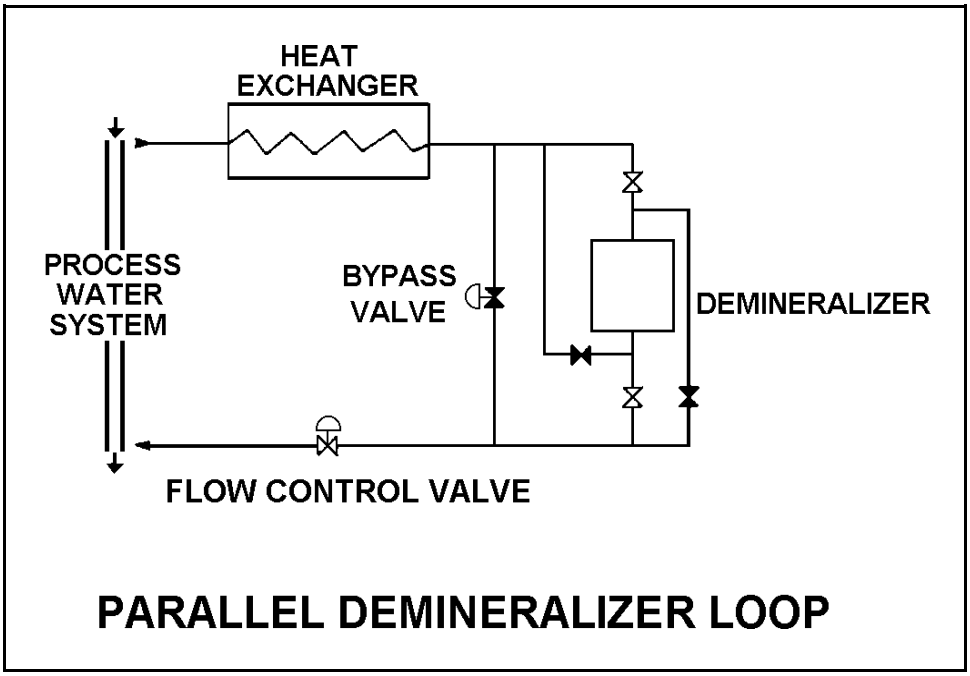
A. Divert 50% of the demineralizer loop flow to bypass the demineralizer.

B. Decrease the process water system pressure from 125 psig to 75 psig.

C. Decrease the flow rate in the demineralizer loop from 105 gpm to 65 gpm.

D. Increase the temperature in the demineralizer loop from 140°F to 200°F.

ANSWER: D.



TOPIC: 291007
KNOWLEDGE: K1.08 [2.6/2.6]
QID: B337 (P1836)

A demineralizer that is continuously exposed to flowing water with high concentrations of suspended solids will first develop an increase in the...

A. conductivity at the demineralizer outlet.

B. decontamination factor of the demineralizer.

C. differential pressure across the demineralizer.

D. pH at the demineralizer outlet.

ANSWER: C.

TOPIC: 291007
KNOWLEDGE: K1.08 [2.6/2.6]
QID: B539 (P836)

A lower than expected differential pressure across a mixed-bed demineralizer is an indication of...

A. depletion of the resin.

B. channeling through the resin bed.

C. improper resin regeneration.

D. a decrease in inlet conductivity.

ANSWER: B.

TOPIC: 291007
KNOWLEDGE: K1.08 [2.6/2.6]
QID: B639 (P1036)

As the operating time of a demineralizer increases, the differential pressure across the demineralizer...

A. decreases due to resin breakdown.

B. decreases due to resin bead surface erosion.

C. increases due to trapping of suspended solids.

D. increases due to depletion of ion exchange sites.

ANSWER: C.

TOPIC: 291007
KNOWLEDGE: K1.09 [2.7/2.7]
QID: B39 (P535)

Which one of the following is an indication of resin exhaustion in a demineralizer:

A. An increase in suspended solids in the effluent

B. A decrease in the flow rate through the demineralizer

C. An increase in the conductivity of the effluent

D. An increase in the differential pressure across the demineralizer

ANSWER: C.

TOPIC: 291007
KNOWLEDGE: K1.09 [2.7/2.7]
QID: B239 (P2637)

A result of proper demineralizer operation on water with ionic impurities is that the exiting water will always have a...

A. higher pH.

B. lower pH.

C. higher conductivity.

D. lower conductivity.

ANSWER: D.